Satisfaction and results of the subareolar incision as treatment for gynecomastia in adolescents: experience of two centers

Andrea Zangari,[1] Carmine Noviello,[2] Camilla Todesco,[1] Mercedes Romano,[2] Letizia Trotta,[2] Carmine Botta,[2] Ilaria Cascone,[2] Salvatore Scommegna,[1] Gabriele Vasta,[1] Vito Briganti,[1] Alfonso Papparella[2]

[1]Operative Unit of Pediatric Surgery, Azienda Ospedaliera San Camillo Forlanini, Roma; [2]Pediatric Surgery Unit, Department of Woman, Child, General and Specialized Surgery, University of Campania "Luigi Vanvitelli", Naples, Italy

Abstract

Gynecomastia is a benign glandular proliferation that can affect adolescents causing significant psychological discomfort. Generally, it is idiopathic but underlying endocrinological conditions must be excluded. Different surgical techniques are available, the surgical correction with subareolar incision achieves the goal of satisfactory aesthetic result for patients. We studied all patients treated for gynecomastia in two centers of pediatric surgery. After collection of a detailed family history, we evaluated the presence of early onset of puberty, congenital abnormalities of the external genitalia, use of drugs, eating habits and the presence of genetic disorders. Laboratory tests and ultrasound were made to exclude endocrinological disorders. The surgical treatment was performed by a subareolar incision with gland and adipose tissue excision. A Body - Q chest module to evaluate patient satisfaction has been proposed to everyone before and after surgery. 47 adolescents with median age of 15 years were surgically treated. Three presented endocrinological disorders. Grade of gynecomastia for surgery was: III in 40 patients and IIb in 7 patients. Postoperative complications occurred in 5 patients. The Body - Q chest module was completed by 42 patients and showed good results for all points analyzed, except for social feelings. Gynecomastia in adolescents can be surgically treated with subareolar incision, reporting good aesthetic results and low incidence of complications. Specific tests are useful to assess patient satisfaction.

Correspondence: Carmine Noviello, Pediatric Surgery Unit, Department of Woman, Child, General and Specialized Surgery, University of Campania "Luigi Vanvitelli", Largo Madonna delle Grazie, 1, 80138 Napoli, Italy.
Tel./Fax: 0815664160.
E-mail: carmine.noviello@unicampania.it

Key words: adolescent; gynecomastia; subareolar incision; body -Q chest test; surgical treatment

Conflict of interest: the authors declare no potential conflict of interest, and all authors confirm accuracy.

Contributions: NC and ZA have had conceptualization of the study; TC and RM have had methodology of the study; SS have had investigation of the documents; TL and BC have had data curation of the study; NC and ZA: writing — original draft preparation; CI and ZA: writing—review and editing; PA and BV have had the supervision.

Ethics approval: the Ethical committee of the university "Luigi Vanvitelli" approved the study (0005720, 17 January 2022). The study is conformed with the Helsinki Declaration of 1964, as revised in 2013, concerning human and animal rights.

Informed consent: all patients participating in this study signed a written informed consent form for participating in this study.

Patient consent for publication: written informed consent was obtained from a legally authorized representative(s) for anonymized patient information to be published in this article.

Received: 19 March 2024.
Accepted: 23 July 2024.

Licensee PAGEPress, Italy
La Pediatria Medica e Chirurgica 2024; 46:336
doi:10.4081/pmc.2024.336

Introduction

Gynecomastia is a unilateral or bilateral benign glandular proliferation of the male's breast. Most of the time it is a benign and temporary proliferation that occurs in different age groups, with a prevalence of 60 - 90% in the neonatal age, 4 – 69% at puberty and 24 - 65% in 50 - 80 years old males.[1] When the growth of the gland does not resolve it becomes pathological causing psychological discomfort in the patient. The peak onset of pathological gynecomastia is between 13 and 14 years of age, it decreases during late adolescence and only 10% of boys shows persistent breast enlargement at the age of 17 years (in 90% of adolescents, it resolves spontaneously within 24 months). In 80% of cases, gynecomastia is classified as idiopathic, but differential diagnosis such as genetic conditions, neoplasms, hormonal pathologies, drug intake and so on must be considered. According to Simon's classification,[2] we can distinguish 4 grades of severity: grade I (small enlargement without skin excess), grade IIa (moderate enlargement without skin excess), grade IIb (moderate enlargement with minor skin excess), grade III (marked enlargement with excess skin, mimicking female breast ptosis). Pubertal gynecomastia may cause significant psychological discomfort in adolescents, therefore, in the absence of underlying pathologies, surgical management may be considered

the treatment of choice if breast enlargement persists after a period of observation of at least 12 months.[3] Other surgical indications are breast pain or tenderness, and/or significant psychological distress.[4]

Different techniques have been proposed for adult patients depending on the type and severity of gynecomastia.[5,6] Some techniques include more aesthetic periareolar incisions, others a widening of the incision and a removal of excess skin tissue, but what is important for the functional and aesthetic results is that the technique used is indicated for the type of gynecomastia and that there is a good experience in the execution.

The purpose of present study is to evaluate the results and satisfaction of adolescents with gynecomastia treated with a subareolar incision.

We validated the diagnostic process and the significance of other factors related to pathological gynecomastia. We recorded the prevalence of complications and the possibility of resolving them without further surgeries. We also assessed the patient's perception of his new physical appearance through tests before and after surgery, as well as their quality of life.

Materials and Methods

For the study we enrolled all patients with a diagnosis of gynecomastia, treated surgically with the subareolar surgical technique at two Pediatric Surgery Units, between January 2012 and December 2019. Patient demography, diagnostic evaluation, Body Mass Index (BMI), medical and surgical treatment, complications, and long-term outcome with patient satisfaction were all included in the recorded data. The diagnosis was made on detailed family history (cases of gynecomastia in the family); early onset of puberty; history of congenital abnormalities of external genitalia; use of antibiotics or other drugs; eating habits; presence of chronic liver disease; genetic or endocrinologic disorders. During the physical examination, attention was paid to the stage of puberty, presence of “pseudo-gynecomastia” and testicular or abdominal neoplastic masses that can be cause of estrogen or testosterone production with peripheral fat aromatization.

We investigated substances that block the production or effects of testosterone (either directly or with action on the testes): digitalis, calcium channel blockers, central nervous system agents, proton pump inhibitors or anti H2, growth hormones, cytotoxic agents antifungals and some antibiotics.

For "pseudo-gynecomastia" or adipomastia was intended the case of patients with only excess fat without increased mammary gland (ultrasound evaluation).

Laboratory investigations were serum levels of testosterone, LH, FSH, estradiol, tumor markers, prolactin, dehydroepiandrosterone, TSH, FT3, FT4. Karyotype was necessary in patient with suspicion of Klinefelter syndrome and specific molecular genetic tests were made if necessary. Ultrasound was used to exclude the presence of testicular and abdominal mass. Indication for surgery was a significant volumetric evolution or an important social distress with Simon grade IIb or higher. For the diagnosis and grading, a physical examination was performed a in supine and upright position. Furthermore, surgeons from both centers evaluated frontal and lateral views of photographic images as well as the ultrasound performed on mammary glands. All patients were advised to start physical activity, with specific exercises for pectoral muscles, before the surgery. This physical activity was restarted 3 months after surgery for at least one year. Postoperative results were evaluated using the same assessment.

Operative technique

The patient was placed in the supine position with abducted limbs. A third-generation cephalosporin was administered (dose 30 mg/kg) at the start of anesthesia. Under general anesthesia the operating field was prepared and draped. According to Webster indication, a subareolar incision was made from nine to three o’clock position, which may be extended more laterally when much tissue towards the axilla has to be excised, at the junction between the areola and the periareolar skin, the areola is distended by pressure exerted downwards about the breast by the encircling hands of the assistant. This incision was deepened vertically for 1 cm through the subcutaneous and breast tissue. A horizontal plane was then prepared, taking care of maintaining a thickness of 1 cm of tissue beneath the nipple-areolar complex, to preserve the vascularization and to avoid post-operative retraction of the areola. Most of the breast tissue was removed by extending the excision circumferentially. The subglandular plane was then reached and prepared, leaving 1 cm thickness of fat on the pectoral fascial plane. In all cases the removed tissue was measured and in some patients (abundant removed tissue) also weighed. The gland was excised and sent for histological examination. The dissection area was irrigated, and vacuum drains inserted. The wounds were sutured with 4/0 absorbable deep dermal stitches. Skin was closed using 4/0 non-absorbable monofilament subcuticular suture.

The drain was removed 24 h postoperatively unless extensive secretion persisted. Antibiotic prophylaxis was started before anesthesia and continued until 48 h after drain removal. Precautions in the dressings were limited to an infrequent and fast shower for one month. A post-intervention compressive garment was recommended for 4 weeks in all cases. The. Postoperative follow-up was performed at 3 and 6 months to assess wound healing, the appearance of scars and chest symmetry. A test (the Body-Q Chest module) was used to assess the patient satisfaction.[7] This test was administered before and after surgery (at least 6 months after the last surgery) and considered 5 scales (nipple, scar, chest, body image and social feelings). For the test, questions were asked about the appearance of the nipple, whether it looked flat and whether it looked better than before. About the wound were asked questions about the location of the wound and the patient’s satisfaction, for the chest was asked whether the appearance is masculine and how it looks with a T-shirt. Then general questions were asked about the body’s appearance to understand the patient’s satisfaction after surgery, and his relationship with others (Table 1).

Informed consent was obtained from all participants to the study, which was conducted in accordance with the Declaration of Helsinki. The Ethical committee of the university “Luigi Vanvitelli” approved the study (0005720, 17 January 2022).

Results

In the period considered (eight years) 47 adolescents or post-adolescents were included in the study, with an average age of 15 years (range: 12-17 years). The average BMI was 27.8 (range: 24. 6 – 30. 5). The medical history allowed us to recognize a familial predisposition to gynecomastia in 6 cases (12. 8%) and a partial syndrome of androgen insensitivity (PAIS) in 3 cases (6. 4%). The clinical examination and karyotype revealed the presence of Klinefelter syndrome (KS) in one case, with hypotrophic testis.

Regarding the drugs used, we have not seen any patients taking these substances.

All patients had normal laboratory tests, except for three who had PAIS. One patient required a genetic test for suspicion of poly-

morphism of the p450 aromatase gene (negative). Ultrasound of the abdomen and testes showed absence of abdominal or testicular masses. Regarding the degree of gynecomastia, the evaluation of the cases revealed that 40 patients had grade III gynecomastia and 7 cases had grade IIb.

Surgery was recommended in 5 cases due to significant volumetric evolution and in the others due to social distress with grade III (Figure 1). In both centers the surgical treatment was a bilateral mastoplasty by a subareolar incision on every patient. The average hospital stay was 3 days (range: 2–6 days). No intraoperative complications were recorded. Postoperative complications occurred in 5 patients: two boys had hematoma that required drainage 24 hours after surgery; two cases of postoperative seroma (one month after operation) which resulted in a modest parietal irregularity and a case of asymmetry from residual glandular tissue that required revision two years later (Table 2). The other 42 patients achieved an excellent esthetic outcome after the first operation (Figure 2). The histological examination revealed a hypertrophic gland in every specimen examined. The drain was removed 24 h postoperatively in 45 patients. Every patient used the compressive garment for 4 weeks. Postoperative evaluation of mammary tissue removal was confirmed by ultrasound in all cases.

The Body-Q chest test was performed before and after surgical treatment, with respectively an average time of 3 months (range 4-6 months) and 10 months (range: 6-15 months). Out of 42 patients who completed the Body-Q chest module, three declined the postoperative test, and two were unable to perform the second test.

Looking at the results of the test before and after the surgery we noticed that the preoperative group had a significantly lower scores on questions concerning the chest ($p<0.005$). All the patients after surgery were fully satisfied about nipple appearance ($p<0.005$); it is interesting to note that before surgery, all the patients, at the question "If the nipple looks flat", were in disagreement, while after the procedure the score reached 4, testifying to the excellent aesthetic appearance.

As for the question "your body is attractive?", before the surgery the score was 1 while after the treatment was 4 (Table 3). For more specific questions regarding the surgical outcome, for example about the surgical scar (the wound is in a good position or not, and if the appearance of the wound is aesthetically good) the score obtained

Figure 1. Preoperative image of adolescent (16-year-old) with grade III (Simon's classification) of gynecomastia.

Figure 2. Post-operative image (two months later) of patient undergoing surgical treatment (subareolar incision) for gynecomastia (same patient of the Figure 1).

Table 1. Body-Q chest test used for the study.

Scale	Example question	Options	Items
Nipple	Your nipple looks flat	Very dissatisfied to very satisfied	5
	Your nipple is better now	Very dissatisfied to very satisfied	5
Scar	Where is your scar?	In very bad position to very good position	5
	Your scar is esthetical good?	Really bad to really good	5
Chest	Your chest looks masculine?	Completely disagree to completely agree	5
	Your chest looks flat with T-shirt?	Completely disagree to completely agree	5
Body image	Your body is attractive?	Completely disagree to completely agree	5
	Do you like your body?	I really dislike it to I really like it	5
Social feelings	Hou do you feel when you are on the beach?	I feel very bad to very good	5
	You have a good impression?	Completely disagree to completely agree	5

Table 2. Postoperative complications, treatments used and results.

Complication	Cases	Treatment	Results
Hematoma	2	Drainage	Good aesthetic outcome
Postoperative seroma	2	Nothing	Modest irregularity
Asymmetry from residual glandular tissue	1	Redo	Good aesthetic outcome

for these questions, present only in the test after surgery, was 4 (Table 4). To explore social feelings, we inquired about the patient's perception of themselves, particularly during their time at the beach. To the questions the score resulted from the test did not reach a statistical significance.

Discussion

Gynecomastia is the most common condition affecting pubertal male's breast. It can affect up to 69% of boys, but it's often a temporary issue. Only 8% of cases have persistent pubertal gynecomastia after 3 years from the first diagnosis, 30 to 50% of cases present as bilateral. This problem is different from "pseudo-gynecomastia", also known as adipomastia, which is commonly observed in obese males, due to increased fat storage. In the literature three histologic types of gynecomastia have been described:[10] the florid form (ductal hyperplasia, loose and edematous stroma), the fibrous form (stromal fibrosis, fewer ducts) and the intermediate form, showing mixed characteristics of the other forms. This condition appears to be caused by a local imbalance between estrogenic stimulation and androgen inhibitory action on breast tissue proliferation. Even though the majority of adolescents with gynecomastia have normal estrogen levels, an increase in the estrogen/androgen ratio leads to gland proliferation.[11] Additionally, in patients affected by gynecomastia, an increased local tissue sensitivity to estrogen metabolites is present.[11] For these reasons endocrinological assessment is important to exclude secondary causes, which are uncommon, but may include conditions such as partial androgen insensitivity syndrome (PAIS),[12,13] congenital anorchia, Klinefelter's Syndrome (KS), testicular feminization, hermaphroditism, adrenal carcinoma, chronic liver disease, primary hypogonadism, secondary hypogonadism, testicular tumors, hyperthyroidism, renal disease and malnutrition.[3] In this series report 3 cases of PAIS were diagnosed. The incidence of gynecomastia in these patients during puberty is reported to be between 71.4% and 100%.[14,15] The incidence of gynecomastia in KS is reported to be about 80% of cases, even though a study found that in KS it is not increased over typically developing boys.[16,17] Since the risk of breast cancer in KS is increased,[18] the negative body image and psychological discomfort make surgical treatment a matter of necessity rather than purely aesthetic.

The use of drugs associated with gynecomastia is more common in adults than in adolescents, also because they are often drugs for prostate cancer, antidepressants and drugs for hypertension, however it is important to investigate the use because the suspension of medications that interferes with the action of androgens, can improve the condition of the mammary glands.

There are different treatment options. Although some authors reported that testosterone gel treatment may solve the gynecomastia without the need for surgery, others advocate surgical approach as the most efficacious for an adequate long-term treatment.[16,17] The management of gynecomastia is still a controversial topic. Nowadays, different surgical techniques have been applied to treat this condition, taking into account the grade and the amount of adipose tissue. The most popular method for removing the glandular tissue is subcutaneous mastectomy, which involves direct resection through a periareolar or transareolar incision.[20] Regardless of the surgical technique, cosmesis is the primary purpose of treatment. Therefore, minimally invasive procedures, which offer faster recovery and lower rates of local complications, are preferred. It has been reported that the small incision for breast parenchymal removal in gynecomastia with liposuction is a good technical approach for consistently improving quality of life. The association of surgical excision and aspiration techniques seems to reduce the complication rate compared to surgical excision alone, but no clear evidence is obtained from the literature, due to the use of several techniques and the lack of a unique classification.[1] Nonetheless, it has been hypothesized that low complication rates of aspiration techniques and combined techniques may be explained by the fact that they are often used to treat less severe forms.[21]

Many studies only focused on selected cases of severeness, not exceeding grade II of gynecomastia according to Simon's classification. As a matter of fact, for high grade gynecomastia, skin resection is often performed, using periareolar concentric excision techniques or excisions resulting in horizontal scars.[20] However, despite the overall satisfactory long term results, an higher incidence of hyper-

Table 3. Body-Q chest test results before and after surgery

Scale	Median score before surger (47 patients)	Median score after surger (42 patients)	p-Value
Nipple	1.2	4.5	<0.005
Chest	1.5	4.6	<0.005
Body image	1.1	4.1	<0.005
Social feelings	1.4	2.2	0.559

Table 4. Results of the questions about the scar differentiated by grade of gynecomastia

Question	Option	Patient 42	Grade III (37)	Grade II b (5)
Where is your scar?	In very bad position	0	0	0
	In bad position	0	0	0
	In no good and no bad position	2	2	0
	In good position	38	35	3
	In very good position	2	0	2
Your scar is esthetical good?	Really bad	0	0	0
	Bad	0	0	0
	No bad and no good	0	0	0
	Good	40	37	3
	Really good	2	0	2

trophic and keloid scars was observed when compared to simple subareolar incision.[22-24] Optimal outcomes, even in severe gynecomastia, can be achieved through simple incision without skin resection due to the young patient's high skin retractability. This is also shown in our experience, using simple inferior periareolar incision in all cases, with low rate of complications and good aesthetic results, as also confirmed by patients' satisfaction test (Body- Q Chest module).

The Body-Q test is a useful tool, used in various studies, to subjectively evaluate the perception of own body after changes in its appearance due to weight loss or surgery and, therefore, to study the impact on the quality of life of the subject.

The evaluation of the test showed a general improvement in the perception of the chest, for general and nipple appearance, also in relation to surgical scar. The only point that has not shown significant improvement is concerning social feelings. The lack of evaluation of patients' satisfaction in certain papers has been questioned as a potential bias when comparing the results of different surgical techniques.[10]

The present study's limitations include the small sample size and lack of comparison to other surgical techniques in terms of results and patient satisfaction.

Conclusions

By performing a careful evaluation of the recent literature regarding the treatment of gynecomastia in pediatric and adolescent age. It has been pointed out that there are many surgical methods and techniques that have good outcomes, but not all studies perform an assessment with tests before and after surgery. Each technique has advantages and disadvantages, and some are reported as superior to the others. In the more severe forms it seems more useful to use techniques that also allow the removal of excess skin, however in this paper, which reports the experience of two centers, we show that a simple subareolar incision allows treatment of any type of gynecomastia and even more severe degrees. Moreover, these two experiences demonstrate that complications, such as post-surgical hematoma or seroma, are minimal and can be resolved without additional incisions. The Body-Q test, in particular the chest module, allowed to evaluate the impact of the result on the quality of life of the patient, showing us how the final appearance is well appreciated by the boy.

We believe that a standardized method for assessing patient satisfaction should be used by all centers to objectively evaluate the results of different treatments.

References

1. Cuhaci N, Polat SB, Evranos B, et al. Gynecomastia: Clinical evaluation and management. Indian J Endocrinol Metab 2014;18:150–8.
2. Simon BE, Hoffman S, Kahn S. Classification and surgical correction of gynecomastia. Plast Reconstr Surg 1973;51:48–52.
3. Kanakis GA, Nordkap L, Bang AK, et al. EAA clinical practice guidelines-gynecomastia evaluation and management. Andrology 2019;7:778-93.
4. Soliman AT, De Sanctis V, Yassin M. Management of adolescent gynecomastia: an update. Acta Biomed 2017;88:204-13.
5. Webster JP. Mastectomy for gynecomastia through a semicircular intra-areolar incision. Ann Surg 1946;124:557–75.
6. Lista F, Ahmad J. Power-assisted liposuction and the pull through technique for the treatment of gynecomastia. Plast Reconstr Surg 2008;121:740-7.
7. Klassen AF, Kaur M, Poulsen L, etval. Development of the BODY-Q chest module evaluating outcomes following chest contouring surgery. Plast Reconstr Surg 2018;142:1600-8.
8. Rose G. Gynecomastia. In: Thaller S, Panthaki ZJ. editors. Aesthetic and reconstructive breast surgery solving complications and avoiding unfavorable results. Informa Healthcare; 2012. p. 190–6.
9. Bannayan G A, Hajdu S I. Gynecomastia: clinicopathologic study of 351 cases. Am J Clin Pathol 1972;57:431-7.
10. Innocenti A, Melita D, Dreassi E. Incidence of complications for different approaches in gynecomastia correction: a systematic review of the literature. Aesthetic Plast Surg 2022;46:1025-41.
11. Lee SW, Kwak DS, Jung IS, et al. Partial androgen insensitivity syndrome presenting with gynecomastia. Endocrinol Metab (Seoul) 2015;30:226-30.
12. Vaidyanathan P, Kaplowitz P. Partial androgen insensitivity syndrome presenting as pubertal gynecomastia: clinical and hormonal findings and a novel mutation in the androgen receptor gene. Endocrinol Diabetes Metab Case Rep 2018;2018:18-0128.
13. Arya S, Barnabas R, Lila AR, et al. Clinical, hormonal, genetic, and molecular characteristics in androgen insensitivity syndrome in an Asian Indian cohort from a single centre in western India. Sex Dev 2021;15:253-61.
14. Hellmann P, Christiansen P, Johannsen TH, et al. Male patients with partial androgen insensitivity syndrome: a longitudinal follow-up of growth, reproductive hormones and the development of gynecomastia. Arch Dis Child 2012;97:403-9.
15. Gulía C, Baldassarra S, Zangari A, et al. Androgen insensitivity syndrome. Eur Rev Med Pharmacol Sci 2018;22:3873-87.
16. Butler G. Incidence of gynaecomastia in Klinefelter syndrome adolescents and outcome of testosterone treatment. Eur J Pediatr 2021;180:3201-7.
17. Raheem AA, Zaghloul AS, Sadek AMG, et al. The impact and management of gynecomastia in Klinefelter Syndrome. Front Reprod Health 2021;3:629673.
18. Swerdlow AJ, Schoemaker MJ, Higgins CD, et al. Cancer incidence and mortality in men with Klinefelter syndrome: a cohort study. J Natl Cancer Inst 2005;97:1204–10.
19. Ward CM, Khalid K. Surgical treatment of grade III gynaecomastia. Ann R Coll Surg Engl 1989;71:226–8.
20. Estors Sastre B, Bragagnini Rodríguez P, Silva Bueno M, et al. Puberal gynecomastia: a comparison between the inferior periareolar approach and the concentric circle technique. Cir Pediatr 2013;26:129-34.
21. McNamara CT, Nuzzi LC, Firriolo JM, et al. Complications and quality of life following gynecomastia correction in adolescents and young men. Plast Reconstr Surg 2022;149:1062e-1070e.
22. Fischer S, Hirsch T, Hirche C, et al. Surgical treatment of primary gynecomastia in children and adolescents. Pediatr Surg Int 2014;30:641-7.
23. De Sanctis V, Soliman AT, Tzoulis P, Daar S, Di Maio S, Kattamis C. Unilateral breast enlargement in males during adolescence (10-19 years): Review of current literature and personal experience. Acta Biomed 2023;94:e2023004.
24. Fruhstorfer BH, Malata CM. A systematic approach to the surgical treatment of gynaecomastia. Br J Plast Surg 2003;56: 237–46.